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(19)

(54) PRODUCTION OF RUBBER GLOVES

(71) We, L R INDUSTRIES LIMITED, a British Company, of North Circular Road, Chingford, London E.4., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention is concerned with the manufacture of rubber gloves.

Rubber gloves are conventionally made by latex dipping. This process typically comprises dipping a preheated glove former into a bath of rubber latex coagulating agent, usually an aqueous solution of calcium nitrate, removing the former and allowing the coagulating agent to dry, dipping the former into a bath of rubber latex, removing the former, and then drying, leaching and vulcanising the resulting coating on the former. After completion of vulcanisation and subsequent cooling, the glove is stripped from the former. This process is normally operated to produce a glove having a substantially uniform thickness.

There is a requirement, however, for users such as surgeons, for rubber gloves that have a greater thickness in the wrist and gauntlet areas or in the cuff area than in the finger and hand portions. Such gloves give the required sensitivity in the finger and hand portions and improved strength in the thicker portion.

Processes have been described for making rubber gloves comprising areas of different thicknesses, but these processes give gloves in which there is a relatively abrupt change in thickness between a thicker portion and a thinner portion and there is a tendency for such gloves to tear at the line of thickness change when being donned by a wearer because of the stress concentration at this line. We have now developed a process for making such gloves comprising areas of different thicknesses, which process comprises dipping a glove former into a bath of rubber latex coagulant so as to coat the whole of the former with coagulant, removing the former and allowing the coagulant to dry, the amount of coagulant thus applied being in excess of that required to coagulate a latex coating of the thickness in the thinner portion of the glove, dipping the whole former in a bath of rubber latex and removing the former so as to obtain the necessary coating thickness for the thinner portion of the glove, and then, before the coating dries, applying additional rubber latex to the areas in which increased thickness is required while rotating the former about its longitudinal axis.

Since there is, in effect, excess coagulant over the whole area, the additional latex applied after the latex dipping operation is coagulated and amalgamates with the existing dipped coating to provide the desired additional thickness in the treated area.

At the same time, we have found that by rotating the former during application and coagulation of the additional latex, the two applications of latex blend together to give a relatively gradual change in the final rubber thickness, rather than a pronounced step.

This procedure is particularly well suited for use in conjunction with the apparatus described in our Specification No. 911,654 which comprises, inter alia, means for rotating and altering the angular attitude of glove formers in a continuously operated latex dipping line. A preferred form of our novel process, in which it is carried out using apparatus as described in our said specification, will now be described in greater detail, by way of example.

Glove formers, mounted as described in our said specification, and preferably formed of porcelain, are preheated by any suitable means to a temperature from 60° to 80°C and each is then dipped into a bath of coagulant so as to obtain a coating having a very strong coagulating effect. A suitable coagulant is. for example, a 50% by weight

aqueous solution of calcium nitrate which is preheated to a temperature of 80°C.

After withdrawal from the bath of coagulant, the former is rotated about its suspension point to bring its longitudinal axis horizontal or vertical with the fingers upwards or to any intermediate disposition therebetwe n and in the chosen attitude it is rotated about its longitudinal axis at an appropriate speed, which is usually from 5 to 6 revolutions per minute, to effect even distribution of the accummulation of deposit on the tips of the fingers and thumb and evaporation of the water, due to the temperature of the former, to leave a partially dry coating of calcium nitrate.

When the coagulant coating has dried to a suitable extent, rotation of the former about its longitudinal axis is stopped and the former is swung back to the vertical position with the fingers down and then immersed in a bath of rubber latex. The dwell time in the latex bath is so chosen that when the former is withdrawn the coagulating effect of the coagulant coating is not exhausted, the thickness of rubber latex deposited on the former being sufficient to give, when vulcanised, a wall thickness of from 0.008 to 0.01 inch substantially evenly over the whole former. Depending on the strength of the coagulant and the composition of the latex bath, the dwell time in the latex bath may typically be from 0 to 50 seconds exclusive of entry and withdrawal times.

After being withdrawn from the latex bath, the former is elevated and rotated as previously described and whilst rotating liquid rubber latex of a suitable composition, preferably having a solids content of not less than 40% by weight, is sprayed or poured as convenient on to the gauntlet or other selected area of the former at a rate such that the required area is covered completely in the shortest possible time, preferably in from 3 to 15 seconds, without such an excess of latex being applied that it runs off the former. Rotation of the former is continued after application of the latex so as to distribute the applied latex evenly around the whole of the circumference of the former and until the applied latex is coagulated by the residual coagulating effect of the coagulant coating. Since the first dipped latex coating is, at this stage, still of open structure, the second sprayed or poured coating readily amalgamates with it so that after the conventional subsequent processing stages of leaching and vulcanisation, the rubber film is homogeneous.

By this procedure gloves can readily be produced with finger and hand rubber thickness of 0.008 to 0.01 inch and with a cuff thickness of from 0.015 to 0.05 inch.

WHAT WE CLAIM IS:—

1. A process for making rubber gloves comprising areas of different thicknesses, which comprise dipping a glove form r into a bath of rubber latex coagulant so as to coat the whole of the former with coagulant, removing the former and allowing th coagulant thereon to dry, the amount of coagulant thus applied b ing in excess of that required to coagulate a latex coating of the thickness required in the thinner portion of the glove, dipping the whole former in a bath of rubber latex and removing the former so as to obtain the necessary coating thickness for the thinner portion of the glove, and then, before the coating dries, applying additional rubber latex to the areas in which increased thickness is required, whilst rotating the former about its longitudinal axis.

2. A process according to claim 1, in which the coagulant is a 50% by weight aqueous solution of calcium nitrate.

3. A process according to claim 1 or 2, in which the additional rubber latex applied has a solids content of not less than 40% by weight.

4. A process according to any of claims 1 to 3, in which the additional rubber latex is applied to the wrist and gauntlet area or the cuff area of the former.

5. A process according to any of claims 1 to 4, in which the glove former is continuously moved through a coagulant application station, a first latex application station and a second latex application station and, in sequence, is dipped at the coagulant application station in the coagulant bath with the fingers of the former downwards, withdrawn from the coagulant, raised to bring the longitudinal axis of the former to an attitude between horizontal and vertical with the fingers upwards and rotated, in this attitude, about its longitudinal axis until the coagulant has dried, returned to the vertical position with the fingers downwards, dipped at the first latex application station, in the latex bath, withdrawn from the latex bath, raised to bring the longitudinal axis of the former to an attitude between horizontal and vertical with the fingers upwards and rotated, in this attitude about its longitudinal axis, and, before the latex coating has dried and while the former is rotated, the additional latex is sprayed or poured onto the desired portions of the former at the second latex application station, and rotation of the former is continued until all the applied latex has coagulated.

6. A process according to claim 1 substantially as herein described.

7. Rubber gloves when made by the process claimed in any of the preceding claims.

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